U.S. FISH AND WILDLIFE SERVICE - SPOTLIGHT SPECIES ACTION PLAN

Common Name: Gila trout

Scientific Name: *Oncorhynchus gilae*

Lead Region: 2

Lead Field Office: New Mexico Ecological Services

Species Information:

Status: Threatened

Recovery Priority Number: 8

Recovery Plan: Gila Trout (*Oncorhynchus gilae*) Recovery Plan, Third Revision, August 19, 2003

Most Recent 5-year Review: None

Other: The 2006 reclassification rule of Gila trout from endangered to threatened (71 FR 40657)

Threats:

During the 19th and 20th centuries, habitat degradation and loss through livestock grazing and timber harvest practices, overfishing, and the introduction of nonnative trout reduced Gila trout to a few isolated populations. Current threats to Gila trout are habitat isolation and fragmentation, nonnative species, wildfire, and climate change.

Isolation and fragmentation

Gila trout are now restricted to a few isolated streams in the upper Gila and San Francisco River drainages. Such fragmentation reduces the total area of habitat available, reduces habitat complexity, prevents gene flow, and accelerates extinction (Saunders et al. 1991, Rieman and McIntyre 1995, Burkey 1995, Dunham et al. 1997, Frankham et al. 2002, Noss et al. 2006). The short length of the occupied stream fragments and resulting small population sizes is also of concern. Stream length is important to ensure adequate complexity and suitable habitat for life history requirements (Rieman and McIntyre 1995, Horan et al. 2000, Hilderbrand and Kershner 2000, Harig and Fausch 2002, Young et al. 2005). Restoration of Gila trout populations has not been successful in Raspberry, Dude, or Sheep Corral Creeks, most likely because of poor quality and/or limited habitat. Failure of the Dude Creek restoration was likely a consequence of continued post-wildfire disturbances to the stream.

Nonnative species

In the early 1900s, uncontrolled angling depleted most populations of Gila trout, which in turn encouraged stocking of hatchery-raised, nonnative trout (Miller 1950, Propst 1994). Due to declining native fish populations, New Mexico Department of Game and Fish propagated and stocked Gila trout, rainbow trout, cutthroat trout, and brown trout during the early 1900s in the historical range of Gila trout. Stocking and naturalization of nonnative trout within the project

area and ensuing hybridization, predation, and competition are major causes for the imperiled status of the Gila trout (U.S. Fish and Wildlife Service (Service) 2003). Recent efforts to recover the species have included eliminating nonnative salmonids from the species' historical habitat through piscicide applications, mechanical removal, and construction of waterfall barriers to prevent nonnative reinvasion.

Wildfire

Wildfires capable of eliminating or decimating fish populations are relatively recent phenomena resulting from the cumulative effects of historical or ongoing grazing practices (removes fine fuels needed to carry low-intensity, natural ground fire), fire suppression (Savage and Swetnam 1990, Swetnam 1990, Touchan et al. 1995, Swetnam and Baisan 1996, Belsky and Blumenthal 1997, Gresswell 1999), and climate change (Westerling et al. 2006). The absence of ground fires allowed a buildup of woody fuels that promotes infrequent, yet intense, crown fires (Swetnam and Baisan 1996). Since the mid-1990s, wildfire has occurred within or near all drainages containing Gila trout populations. In 2003 alone, over 80,937 ha (200,000 ac) burned in the Gila National Forest (Southwest Interagency Coordination Center fire occurrence records). High-severity wildfires, and subsequent floods and ash/debris flows have caused the extirpation of six populations of Gila trout since 1989 (Rinne 1996, Brown et al. 2001, Service 2003, Coleman 2007). Widespread and intense wildfires remain a threat to Gila trout (Brown et al. 2001, Coleman 2007), especially in light of the projected effects of climate change (McKenzie et al. (2004, Westerling et al. 2006). An emergency evacuation plan is in place, and has been used to help offset the immediate loss of populations from wildfire and subsequent channel degradation (Brooks 2004).

Climate change

In the Colorado River basin, which includes the Gila River watershed, widespread, reliable temperature records are available for about the past 150 years. These records document an annual mean air surface temperature increase of approximately 2.5°F (1.4°C) over the past century with temperatures today at least 1.5°F (0.8°C) warmer than during the 1950 drought (NRC 2007, Lenart et al. 2007). Both in terms of absolute degrees and in terms of annual standard deviation, the Colorado River basin has warmed more than any region of the United States (National Academy of Science 2007). Over western North America, median temperatures are projected to increase between 2.3°F (1.3°C) and 7.9°F (4.4°C) by 2100 depending on the rate of green house gas emissions (Christensen and Lettenmaier 2006).

Climate change is predicted to have four major effects on the cold water stream habitat: 1) increased water temperature; 2) decreased stream flow; 3) a change in the hydrograph; and 4) an increased occurrence of extreme events (fire, drought, and floods). It is anticipated that any of these outcomes, alone or in combination would reduce that amount of suitable habitat available to Gila trout. Using a regional climate model, Kennedy et al. (2008) predict a 20 percent decrease in summer precipitation and a 2° C increase in average summertime air temperature by mid-century in watersheds occupied by Gila trout. Because of the warmer air temperatures and corresponding increase in water temperature, they predict a 70 percent loss of suitable habitat in existing Gila trout streams (Kennedy 2008).

Target: The 5-year goal is to improve the status of the species. Although delisting is the ultimate goal, the measures needed for delisting cannot be completed in five years.

Measure: The intent of the actions outlined for the next 5 years is to increase the number of secure populations. This involves restoring Gila trout to the upper West Fork Gila drainage. To accomplish this task equal numbers of Main Diamond and South Diamond fish will be translocated into the main stem West Fork Gila River after the piscicide treatment is complete. Whiskey Creek lineage will be expanded to the upper West Fork Gila River, above the confluence of Whiskey Creek and either South Diamond or Whiskey Creek lineage (depending on availability) will be introduced into Cub Creek. In Arizona, Main Diamond and South Diamond fish will be introduced into Frye, Ash, and Marijilda Creeks. In addition, Spruce Creek lineage will be reintroduced into KP Creek and another stream (yet to be identified) in the Blue River drainage. Maintaining the broodstock at Mora National Fish Hatchery and Technology Center (MNFHTC) for the Main and South Diamond lineages is essential for augmentation and re-introduction projects. In the next 5 years it is also anticipated that broodstock for the Spruce Creek lineage will be established, which will necessitate the use of the naturalized rearing habitats.

Actions:

Actions	Threats Addressed	Tasks	Implementing Party	Cost
Re-establish metapopulation in West Fork Gila headwaters	1. Competition, predation, and hybridization by nonnative trout	Remove nonnative trout from Cub, Packsaddle, Langstroth, Trail, Rawmeat, and lower White creeks	NMDGF, FWS, FS	$75-100k
	2. Isolation and fragmentation	Monitor treatment results, including aquatic inverts	NMDGF, FWS, FS	$15k/yr
	3. Fire	Translocate Gila trout to resotration streams	NMDGF, FWS, FS	$20k/yr, 3 yrs
	4. Climate change	Monitor genetics of populations	FWS, UNM	$50k/yr
Maintain hatchery broodstock of Gila trout	1. Competition, predation, and hybridization by nonnative trout	Following procedures in broodstock management plan, maintain broodstock for the 2 lineages, create broodstock for Spruce Creek lineage	FWS, Mora NFHTC	250k
	2. Isolation and fragmentation	Develop and use naturalized habitat rearing capacity	FWS, Mora NFHTC	100k
	3. Fire	Use polyculture (catastomids) in naturalized rearing	FWS, Mora NFHTC	10k
	4. Climate change			
Expand the range of the Spruce	1. Isolation and fragmentation	Prioritize expansion streams	FWS, AZGF, FS	$5k

Creek lineage into KP Creek and other suitable creeks	2. Fire 3. Climate change	Conduct pre-treatment surveys	FWS, AZGF, FS	$25k
		Prepare environmental documents, if needed		$50k
		Obtain necessary permits, if needed		
		Construct or improve barrier , if needed		
		Remove nonnative trout, if present	FWS, AZGF, FS	$100k
		Translocate Gila trout to restoration stream	FWS, AZGF, FS, NMDGF	$30k/yr, 3 yrs
Establish San Francisco- Gila River populations in AZ streams using Main Diamond and South Diamond lineages	1. Competition, predation, and hybridization by nonnative trout 2. Isolation and fragmentation 3. Fire 4. Climate change	Prioritize reintroduction streams	FWS, AZGFD, FS	$5k
		Conduct pre-treatment surveys	FWS, AZGFD, FS	$25k
		Prepare environmental documents, if needed	FWS, AZGFD, FS	$100k
		Obtain necessary permits, if needed	FWS, AZGFD, FS	
		Construct or improve barrier , if needed	FWS, AZGFD, FS	$250k
		Remove nonnative trout, if present	FWS, AZGFD, FS	$100k
		Translocate Gila trout to restoration stream	FWS, AZGF, FS, NMDGF	$30k/yr, 3 yrs

Additional Funding Analysis: projects that would be completed if additional funds become available.

Actions	Threats Addressed	Tasks	Implementing Party	Cost
Initiate NEPA and associated analysis for rennovation of additional streams in New Mexico	All	Identify agency biologists or contractors to lead environmental analysis, begin writing	FWS, FS, NMDGF	50k
Establish additional broodstock/rearing facility	All	Establish additional broodstock/rearing facility	FWS, AZDGF, NMDGF	250k

Role of other agencies:

New Mexico Department of Game and Fish (NMDGF), Arizona Game and Fish Department (AZDGF), U.S. Fish and Wildlife Conservation Office, Gila National Forest, and MNFHTC are all key players in the recovery actions. All recovery streams are on U.S. Forest Service land so coordination with the U.S. Forest Service is essential for environmental compliance, logistical support, and project implementation. NMDGF and AZGFD are largely responsible for managing, monitoring, and setting fishing regulations for the species and coordinate closely with the Service on these activities. The University of New Mexico has the expertise to analyze the population genetics of the various lineages.

Role of other ESA programs:

Restoration projects require section 7 compliance. New Mexico Ecological Services Field Office prepares the biological opinions for recovery projects involving Gila trout.

Role of other FWS programs:

The New Mexico Fish and Wildlife Conservation Office is a key player in all restoration projects in terms of environmental compliance (intra-service consultation), planning, logistics, and on the ground implementation of the projects. MNFHTC is currently the only hatchery raising Gila trout.

Additional funding analysis:

Additional funding would be very useful in helping agency personnel (U.S. Forest Service, NMDGF, AZGFD) move ahead on the environmental compliance documents needed for the next renovation projects. Although it is unlikely that the planning, compliance documents, and implementation of additional projects could all occur within the next 5 years, getting a head start on the process would accelerate the time that additional populations of Gila trout were returned to their historical habitats. The U.S. Forest Service (NEPA and associated analysis, i.e., BAE, MIS ($50,000)), NMDGF (Water Quality Control Board compliance (15,000)), and the Service (section 7 ($25,000)) could use the funds to complete the necessary paper work and pre-treatment (invertebrate) surveys.

In addition, adding another hatchery to expand the production capacity of Gila trout is recommended. Additional fish production could expedite the number of streams that could be stocked in Arizona and would also contribute to the recreational fish stocking program. Funds could be directed either to MNFHTC ($250,000) to expand their facilities and program or to one of the State agencies (NMDGF or AZDGF) to develop a program. However, an investment of this type would need to have continuous funding support beyond the initial investment.

Field Supervisor

Date 7/30/09

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